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AGRICULTURAL CHEMICALS FOR SOIL AND PLANT PROTECTION

- USSR -

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FOREWORD

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JPRS: 6466

CSO: 4814-D

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[Following is a translation of two articles from the Russian-language periodical Zashchita Rasteniy ot Vreditel'ey i Bolezney (Protection of Plants from Pests and Diseases), Moscow, No. 8, 1960. Page and author are given under individual article headings.]

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I. DUSTING WITH MOIST PREPARATIONS

Pages 22-23

Ya. E. Butvinnik, Senior
Engineer of the All-Union
Scientific Research Institute
of Agricultural Machinery

A substantial disadvantage to the dusting method is the extremely large expenditure of poison chemical powder caused by the weak adherence and holding capacity of the particles of dust to the leaf surface and the large removal of these particles by the wind and the air streams at the moment of application.

Production and scientific workers have simultaneously raised the question on the use of moist dusting, i.e., wetting dry preparations with water or combination of liquids and dry preparations with different functions. In this connection, an economy of dust-form poison, in research conducted by VIZR [Vsesoyuznyy Institut Zashchita Rasteniy -- All-Union Institute of Plant Protection], of 40-50% was achieved. Such tests have been made since 1939. In the postwar period the combined dusters-sprayers OKS, OMK-30, OPM, OKP-15, and ONK have been created. However they all differ little from one another according to their technical process and have a serious disadvantage since they are made up of independent units for dusting and for spraying.

In the past year a laboratory apparatus was prepared at VISKhOM which permits us to conduct both individual dusting and spraying as well as dusting with moistening; a qualitatively new principle has been used as the basis for the technological process: the dust is mixed with water not in the reservoir but directly upon passing from the spray nozzle. In this manner even the task of combining the dry and liquid preparations with different purposes has been solved, for example, an insecticide and an herbicide, an insecticide and a fungicide, etc., which is very important for economy.

Special attention has been given to moistened dusting with the introduction into production of such effective agents, as heptachlor, tsineb, captan, carbophos, methylmercaptophos, wet dusts of hexachlorocyclohexane (Russian -- GKhtsG), DDT, DDD, ester-sulfonate, copper oxychloride, etc.

The production of operating mixtures at the outlet of the spraying components of the machine permits us to be free from the cumbersome filling stations, to free a considerable number of workers and to improve the sanitary and hygiene working conditions.

The research on this problem at VISKhOM is being continued, especially to study ways of obtaining at the sprayer outlets liquid mixtures of concentrates and water.

FIGURE APPENDIX



Figure 1. An experimental apparatus for dusting with moistened preparations.

II. AEROSOL SMOKE POTS IN PROTECTIVE SOILS

Pages 38-39

A. I. Sidorov, Aspirant
at the All-Union Institute
of Plant Protection

The aerosol method of combatting pests and diseases of covered soil has not been widely applied up to the present owing to the fact that it is impossible to generate aerosols from a number of highly effective organophosphorus and other preparations, for example ester-sulfonate and hexachlorophene, since these toxicants decompose at high temperatures (380-580° C).

The decomposition of the preparations can be prevented by using aerosol smoke pots, the smoldering temperature of which is around 200° and lower. Such smoke pots are being produced abroad (by the West German firm Bayer -- with dithiophos, by the English firm VAECO -- with lindane, azobenzene and other toxicants) and are being used to disinfect conservatories, hothouses and seed beds. We are now preparing to mass produce them.

To disinfect green plants the author developed aerosol smoke pots containing metaphos, thiophos, dithiophos-1 (tetra-ethylthiopyrophosphate), dithiophos-11 (dimethyldiethylthiopyrophosphate), ester-sulfonate, hexachlorophene, preparation VIZR-47, etc. Eight compositions containing the following components (in %) were tested (see table).

TABLE 1

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
Thiophos	15	--	23	--	--	--	--	--
Metaphos	--	15	--	23	--	--	--	--
Ester-sulfonate	15	15	--	--	--	--	--	--
Dithiophos-1	--	--	--	--	25	--	--	--
Dithiophos-11	--	--	--	--	--	25	--	--
Hexachlorophene	--	--	--	--	--	--	25	--
VIZR-47	--	--	--	--	--	--	--	23
Thermal mixture	25	25	25	25	22	22	48	25
Filler	45	45	52	52	53	53	--	52

The compositions presented, as the tests indicated, possess a low sensitivity to mechanical and thermal changes. In order to test these compositions 5 g tablets and smoke pots weighing 500 g were prepared. The first tests were conducted on the effect of the smoldering cardboard strip, the second on the firing match.

At the Scientific Research Institute of Truck Crops (Moscow Oblast), the aerosols were tested (together with B. A. Gerasimov and Ye. A. Osnitska), in chambers and hothouses against the agent of tomato leaf mold, spider mite and other pests.

Phytocidity was determined on the plants (cucumbers and tomatoes) at various phases of growth.

Thiophos and ester-sulfonate aerosols (composition No. 1) in a dose of 5-8 g/m³ and for an exposure of 3 hours destroyed 95-100% of the mites, all whiteflies and aphids. Under the same conditions composition No. 2 had an analogous effect on mites and whiteflies.

Total destruction of the spider mites was also achieved with thiophos (Comp. No. 3) at the same exposure time and at doses of 3-5 g/m³, with dithiophos-1 (Comp. No. 5) -- at the same exposure at doses of 0.5, 1, 1.5 and 2.5 g/m³ and at a temperature higher than 12° C; with preparation VIZR-47 (Comp. No. 8) -- at that same exposure, in doses of 40-50 g/m³ and a temperature higher than 20°. The latter composition at this temperature and exposure produced a high death rate among the mites (95%) even at a lesser doses, to 10 g/m³, but it lost its effectiveness at lower temperatures (at 6-7° for example even a 50 g/m³ dosage did not give any results).

Causative spores of tomato leaf mold were completely destroyed by the hexachlorophene aerosol (Comp. No. 7) at an exposure of 20 hours in doses of 6-8 g/m³ and VIZR-47 in a dose of 40 g/m³, but the lesser doses, 10-20 g/m³, caused 94-98% death rate for the spores.

It should be noted that compositions No. 7 at 8 g/m³ and more, and No. 8 burned the plants in every test.

At the Obkhazsk quarantine laboratory thiophos, metaphos, dithiophos-1, dithiophos-11, and other aerosols were tested by us (together with P. I. Mitrofanov) on pests of citrus plants. Compositions Nos. 1-4 in doses of 5 and 10 g/m³ and exposures of 1 and 2 hours completely destroyed the red citrus mite, larvae of citrus pulvinaria and the female citrus mealybug. Hatching of larvae from the pulvinaria eggs stopped. Aerosols of dithiophos-1 and -11 (compositions Nos. 5-6) ensured 100% death rate for pulvinaria at 1 hour exposure and a dose of 10 g/m³, but for mites, 10 minutes and 5 g/m³.

The test results provide the basis to consider aerosols as very prospective forms for disinfecting plants in hothouses, conservatories and green houses, railway wagons, under tents, in soil sheds and also for treating lemon trees against mites in the autumn.

In protected soil especially adoptable are the smoke pots containing dithiophos-ll, metaphos and ester-sulfonate, comparatively low-toxic for warm blooded animals. The use of smoke pots containing organo-phosphorus preparations requires the observance of safety measures just as when working with arsenic, so for thiosphos preparations.

The high effectiveness of aerosols permits a considerable reduction in the amount of treatments done and lowers their cost.